

# Solar Energy Technology Program

## Furthering Energy Independence

### A Portfolio of Solar Technologies

Solar technologies use the sun's energy and light to provide heat, light, hot water, electricity, and even cooling for homes, businesses, and industry. Through public-private partnerships, the Department of Energy's Solar Energy Technology Program sponsors research and development that improves the performance and reduces the cost of solar technologies. The Program supports the research activities of world-class scientists and engineers in industry, universities, and the national laboratories.

The three components of the Program—Photovoltaics, Solar Buildings, and Concentrating Solar Power—make up a comprehensive portfolio that addresses remote, distributed, and central energy markets:

- **Photovoltaics** develops semiconductor materials to convert sunlight directly into electricity, through an instantaneous, quiet process that uses no moving parts.
- **Solar Buildings** aids industry in developing low-cost solar thermal technologies for water and space heating in buildings.
- **Concentrating Solar Power** works with industry to develop reliable, cost-competitive systems that drive steam turbines and systems using heat from concentrated sunlight.

### Multiple Markets, Multiple Solutions

With continued R&D, solar technologies can provide our nation with low-cost energy from an abundant domestic resource, and help reduce the country's greenhouse gas emissions. Through a combination of photovoltaic and thermal technologies, it will be practical to provide all the energy needed by an energy-efficient home. It will also be cost-effective in some regions to generate power at a utility-scale through concentrating solar power.

Improvements in performance and cost will continue to open new markets for solar technologies. Photovoltaics are already making significant inroads in high-value niche markets, such as remote, stand-alone power for telecommunications and other “off-grid” applications. International market growth is also strong for photovoltaics, fueled by the two billion people in developing countries who have no access

### Reliable, Affordable Energy

*The mission of the Solar Energy Technology Program is to mobilize the nation's resources to develop reliable and affordable solar technologies that further energy independence and economic prosperity while improving environmental quality.*



to electricity grids. Applications range from water pumping, communications, and lighting, to village power. As manufacturing costs fall, photovoltaics are increasingly used for homes and other buildings already connected to the grid. In deregulated domestic electricity markets, distributed power may represent a significant niche for photovoltaic systems.

Solar thermal technologies show substantial promise for replacing conventional gas or electric technologies in homes and other buildings. The water heater market is particularly attractive because it uses as much energy as the family automobile. Key markets for solar water heaters presently include the south and southwestern regions of the country. Pool-heating is another attractive market with over 25,000 solar pool heating systems sold in the United States each year.

The third category of research being targeted by the Program is technology for concentrating solar power. This technology is best suited for utility-scale power generation, to supply the electricity needs of communities, towns, or cities. Cost of energy from these plants is currently as low as 10.4 cents per kilowatt-hour, still too high to compete with fossil fuels except in small markets. With the help of federal R&D, industry hopes to achieve costs in the range of 3.54 to 4.34 cents per kilowatt-hour by 2020, which would make it an economic



*Sixty AC modules provide power to the Pentagon building in Arlington, Virginia. The modules, trademarked under the name SunSine® were developed by Ascension Technology, Inc. with support of DOE's PV Program under the PV Manufacturing Technology Initiative (PVMaT). The AC module standardizes the electrical connection for applications on buildings.*

option, particularly in the rapidly growing southwest. Thermal storage enables the technology to generate electricity during periods when the sun is not shining, adding value to the energy since it can be used during periods of peak demand.

In all of its forms, solar energy will provide a renewable energy option for the United States; an option that will last as long as the sun continues to shine.

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



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